

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
 United States Patent and Trademark
 Office
 Box PCT
 Washington, D.C.20231
 ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

19 August 1999 (19.08.99)

International application No.

PCT/GB98/03816

Applicant's or agent's file reference

545P77587

International filing date (day/month/year)

17 December 1998 (17.12.98)

Priority date (day/month/year)

17 December 1997 (17.12.97)

Applicant

DYSON, James

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

16 July 1999 (16.07.99)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
 34, chemin des Colombettes
 1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Lazar Joseph Panakal

Telephone No.: (41-22) 338.83.38

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 545P77587	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 98/ 03816	International filing date (day/month/year) 17/12/1998	(Earliest) Priority Date (day/month/year) 17/12/1997
Applicant NOTETRY LIMITED et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☒ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☒ because this figure better characterizes the invention.

4

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/03816

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A47L9/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 245 224 A (PULLMAN AB) 11 November 1987 see page 6, line 30 - page 7, line 34 ---	1,12,13
A	US 5 230 722 A (YONKERS ROBERT A) 27 July 1993 see column 2, line 47 - column 3, line 4; figures 1-8 ---	1,12
A	GB 2 167 680 A (ENVIRO VAC LIMITED) 4 June 1986 see the whole document ---	1
A	DE 93 17 809 U (VORWERK & CO INTERHOLDING GMBH) 22 November 1990 see page 7, line 4 - page 9, line 22; figure 2 --- -/-	8

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

Z document member of the same patent family

Date of the actual completion of the international search

8 July 1999

Date of mailing of the international search report

14.07.99

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Laue, F

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/03816

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 86 07 553 U (VORWERK & CO INTERHOLDING GMBH) 15 May 1986 see page 2, line 10 - page 3, line 2 -----	8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 98/03816

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-7,12-17

Vacuum cleaner comprising a separating apparatus provided with a pre-motor filter and a post motor-filter said filters being characterized in that the filters are cylindrical. The objective problem to be solved by this particular arrangement of the filters is to improve the filtering characteristics with respect to clogging compared to known apparatuses provided with filters of the flat type.

2. Claims: 8-11

Vacuum cleaner comprising a separating apparatus provided with a pre-motor filter and a post motor-filter characterized in that the post-motor filter is housed in a casing containing a plurality of slots. The objective problem to be solved by this arrangement is to avoid a stream of air to be expelled.

The two groups of claims concern different subject-matter which solve problems which are not linked by a single inventive concept.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 98/03816

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0245224	A	11-11-1987	SE 452850 B	21-12-1987
			AT 58631 T	15-12-1990
			SE 8601621 A	11-10-1987

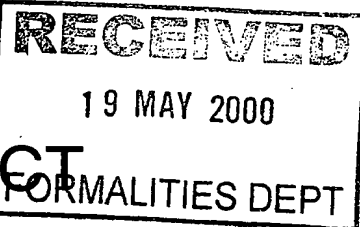
US 5230722	A	27-07-1993	NONE	

GB 2167680	A	04-06-1986	NONE	

DE 9317809	U	23-03-1995	NONE	

DE 8607553	U	15-05-1986	NONE	

PATENT COOPERATION TREATY



From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

DEVONS, D.
MARKS & CLERK
57-60 Lincoln's Inn Fields
London WC2A 3LS
GRANDE BRETAGNE

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing
(day/month/year)

17. 05. 00

Applicant's or agent's file reference
545P77587

IMPORTANT NOTIFICATION

International application No.
PCT/GB98/03816

International filing date (day/month/year)
17/12/1998

Priority date (day/month/year)
17/12/1997

Applicant
NOTETRY LIMITED et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/

 European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer

Emer, W

Tel. +49 89 2399-2972



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 545P77587	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB98/03816	International filing date (<i>day/month/year</i>) 17/12/1998	Priority date (<i>day/month/year</i>) 17/12/1997
International Patent Classification (IPC) or national classification and IPC A47L9/16		
Applicant NOTETRY LIMITED et al.		



1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 16/07/1999	Date of completion of this report 17. 05.00
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Laue, F  Telephone No. +49 89 2399 2490

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB98/03816

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-8 as originally filed

Claims, No.:

1-17 as originally filed

Drawings, sheets:

1/4-4/4 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
☒ claims Nos. 17.

because:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB98/03816

- ☒ the said international application, or the said claims Nos. see separate sheet VII relate to the following subject matter which does not require an international preliminary examination (*specify*):

see separate sheet

- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

- ☐ no international search report has been established for the said claims Nos. .

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
☒ paid additional fees.
☐ paid additional fees under protest.
☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
☒ not complied with for the following reasons:

see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
☐ the parts relating to claims Nos. .

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB98/03816

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-16
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-16
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-16
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB98/03816

Chapter IV:

The requisite unity of invention (Rule 13.1 PCT) does not exist inasmuch as a technical relationship involving one or more of the same or corresponding special technical features in the sense of Rule 13.2 PCT does not exist between the subject-matter of the following groups of dependent claims:

- 1-7, 12-17

- 8-17

Whereby

Claims: 1-7,12-17 are directed to a vacuum cleaner comprising a separating apparatus provided with a pre-motor filter and a post motor-filter said filters being characterised in that the filters are cylindrical. The objective problem to be solved by this particular arrangement of the filters is to improve the filtering characteristics with respect to clogging compared to known apparatuses provided with filters of the flat type.

Claims: 8-17 are directed to a vacuum cleaner comprising a separating apparatus provided with a pre-motor filter and a post motor-filter characterised in that the post-motor filter is housed in a casing containing a plurality of slots.

The objective problem to be solved by this arrangement is to avoid a stream of air to be expelled.

The two groups of claims concern different subject-matter which solve problems which are not linked by a single inventive concept.

Chapter v:

1. Concerning independent claim 1:

The most relevant state of the art is disclosed in EP-A-245224(D1).

D1 describes a vacuum cleaner comprising an airflow path having a dirty air inlet 45 and a clean air outlet 17, a fan for drawing an airflow along the air flow path from the inlet to the outlet, a motor 25 for driving the fan, separating means 1 for separating dust from the air flow, a pre-motor filter 31 and a post-motor filter 39.

The aim of the invention is to improve apparatuses of the above mentioned type in such

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB98/03816

a way that the filtering characteristics with respect to clogging of the filters are improved.

This is achieved in that both filters have a cylindrical shape, whereby a comparatively larger filtration surface compared to known flat filters is available.

D1 already uses a cylindrical pre-motor filter but the advantages of this particular shape is not addressed in this document. None of the cited documents suggest to use cylindrical shaped post-motor filters.

The subject-matter of claim 1 is therefore novel and inventive and has an industrial applicability in the field of vacuum cleaners (art. 33(2)(3)(4) PCT).

2. Concerning independent claim 8:

The subject matter of claim 8 essentially differs from D1 in that the post-motor filter is housed in a casing containing a plurality of slots or apertures, the slots or apertures forming the clean air outlet and being arranged such that, in use, the airflow is diffused as it leaves the clean air outlet.

The aim of these distinguishing features is to reduce or avoid disturbances bound to air from the vacuum cleaner in form of a stream.

Despite the fact that DE-U-8607553(D2) describes a vacuum cleaner where a filter is housed in a casing containing a plurality of slots or apertures, there is no hint with respect to the benefit of a housing closed by a lid having slots or apertures and there is also no particular hint to apply the teachings of D2 (to cover the air exhaust with a slotted cover) to the vacuum cleaner described in D1. Therefore neither the problem nor the corresponding solution is mentioned in the above cited documents.

The subject matter of claim 8 is therefore novel and inventive and has an industrial applicability in the field of vacuum cleaners (art. 33(2)(3)(4) PCT)

3. Concerning the dependent claims:

The claims concern particular embodiments of the apparatus defined either in claim 1 or in claim 8 and meet therefore also the requirements of Art. 33(2)(3)(4) PCT.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB98/03816

Chapter VII:

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

Independent claim 1 and 8 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in a preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in a characterising part (Rule 6.3(b)(ii) PCT).

Claim 17 contain a reference to the drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference 545P77587		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) FOR FURTHER ACTION	
International application No. PCT/GB98/03816	International filing date (day/month/year) 17/12/1998	Priority date (day/month/year) 17/12/1997	
International Patent Classification (IPC) or national classification and IPC A47L9/16			
Applicant NOTETRY LIMITED et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 7 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 16/07/1999	Date of completion of this report 17. 05. 00
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Laue, F Telephone No. +49 89 2399 2490 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB98/03816

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-8 as originally filed

Claims, No.:

1-17 as originally filed

Drawings, sheets:

1/4-4/4 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
- ☒ claims Nos. 17.

because:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB98/03816

- ☒ the said international application, or the said claims Nos. see separate sheet VII relate to the following subject matter which does not require an international preliminary examination (*specify*):

see separate sheet

- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the said claims Nos. .

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☒ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. .

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB98/03816

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-16
	No: Claims
Inventive step (IS)	Yes: Claims 1-16
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-16
	No: Claims

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Chapter IV:

The requisite unity of invention (Rule 13.1 PCT) does not exist inasmuch as a technical relationship involving one or more of the same or corresponding special technical features in the sense of Rule 13.2 PCT does not exist between the subject-matter of the following groups of dependent claims:

- 1-7, 12-17
- 8-17

Whereby

Claims: 1-7,12-17 are directed to a vacuum cleaner comprising a separating apparatus provided with a pre-motor filter and a post motor-filter said filters being characterised in that the filters are cylindrical. The objective problem to be solved by this particular arrangement of the filters is to improve the filtering characteristics with respect to clogging compared to known apparatuses provided with filters of the flat type.

Claims: 8-17 are directed to a vacuum cleaner comprising a separating apparatus provided with a pre-motor filter and a post motor-filter characterised in that the post-motor filter is housed in a casing containing a plurality of slots.
The objective problem to be solved by this arrangement is to avoid a stream of air to be expelled.

The two groups of claims concern different subject-matter which solve problems which are not linked by a single inventive concept.

Chapter v:

1. Concerning independent claim 1:

The most relevant state of the art is disclosed in EP-A-245224(D1).

D1 describes a vacuum cleaner comprising an airflow path having a dirty air inlet 45 and a clean air outlet 17, a fan for drawing an airflow along the air flow path from the inlet to the outlet, a motor 25 for driving the fan, separating means 1 for separating dust from the air flow, a pre-motor filter 31 and a post-motor filter 39.

The aim of the invention is to improve apparatuses of the above mentioned type in such

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB98/03816

a way that the filtering characteristics with respect to clogging of the filters are improved.

This is achieved in that both filters have a cylindrical shape, whereby a comparatively larger filtration surface compared to known flat filters is available.

D1 already uses a cylindrical pre-motor filter but the advantages of this particular shape is not addressed in this document. None of the cited documents suggest to use cylindrical shaped post-motor filters.

The subject-matter of claim 1 is therefore novel and inventive and has an industrial applicability in the field of vacuum cleaners (art. 33(2)(3)(4) PCT).

2. Concerning independent claim 8:

The subject matter of claim 8 essentially differs from D1 in that the post-motor filter is housed in a casing containing a plurality of slots or apertures, the slots or apertures forming the clean air outlet and being arranged such that, in use, the airflow is diffused as it leaves the clean air outlet.

The aim of these distinguishing features is to reduce or avoid disturbances bound to air from the vacuum cleaner in form of a stream.

Despite the fact that DE-U-8607553(D2) describes a vacuum cleaner where a filter is housed in a casing containing a plurality of slots or apertures, there is no hint with respect to the benefit of a housing closed by a lid having slots or apertures and there is also no particular hint to apply the teachings of D2 (to cover the air exhaust with a slotted cover) to the vacuum cleaner described in D1. Therefore neither the problem nor the corresponding solution is mentioned in the above cited documents.

The subject matter of claim 8 is therefore novel and inventive and has an industrial applicability in the field of vacuum cleaners (art. 33(2)(3)(4) PCT)

3. Concerning the dependent claims:

The claims concern particular embodiments of the apparatus defined either in claim 1 or in claim 8 and meet therefore also the requirements of Art. 33(2)(3)(4) PCT.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB98/03816

Chapter VII:

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

Independent claim 1 and 8 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in a preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in a characterising part (Rule 6.3(b)(ii) PCT).

Claim 17 contain a reference to the drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here.

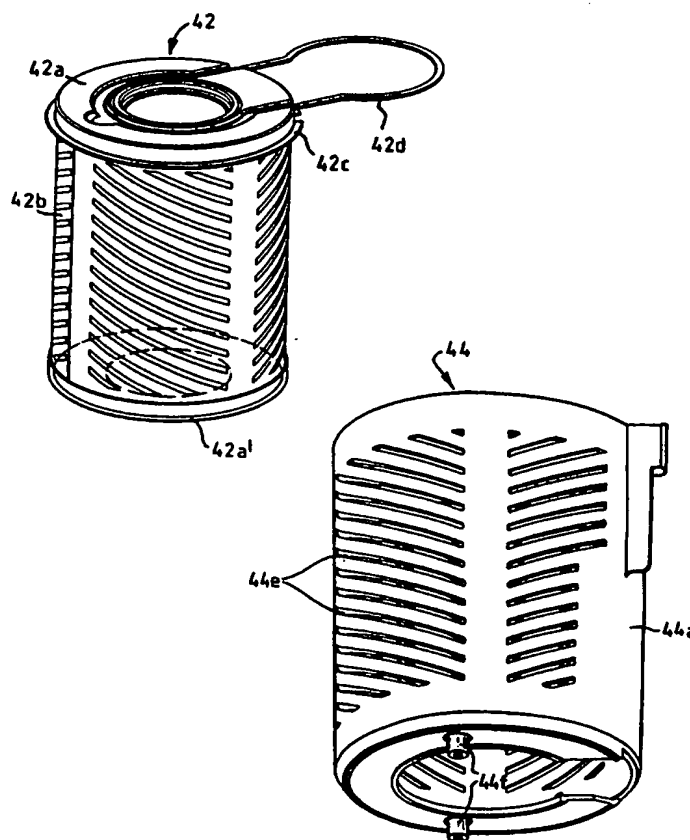
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/GB98/03816 (22) International Filing Date: 17 December 1998 (17.12.98) (30) Priority Data: 9726676.1 17 December 1997 (17.12.97) GB (71) Applicant (for all designated States except US): NOTETRY LIMITED [GB/GB]; Kingsmead Mill, Little Somerford, Wiltshire SN15 5JN (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): DYSON, James [GB/GB]; Kingsmead Mill, Little Somerford, Wiltshire SN15 5JN (GB). (74) Agent: DEVONS, David, Jon; Marks & Clerk, 57-60 Lincoln's Inn Fields, London WC2A 3LS (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published Without international search report and to be republished upon receipt of that report.

(54) Title: A VACUUM CLEANER

(57) Abstract

The invention provides a vacuum cleaner comprising an airflow path having a dirty air inlet (14) and a clean air outlet (44e), a fan (48) for drawing an airflow along the airflow path from the dirty air inlet (14) to the clean air outlet (44e), a motor (50) for driving the fan (48), separating apparatus (18) for separating dirt and dust from the airflow, a pre-motor filter (32) arranged upstream of the motor (50) and a post-motor filter (42) arranged downstream of the motor (50), wherein both the pre-motor filter (32) and the post-motor filter (42) are cylindrical filters. The invention further provides a vacuum cleaner comprising an airflow path having a dirty air inlet (14) and a clean air outlet (44e), a fan (48) for drawing an airflow along the airflow path from the dirty air inlet (14) to the clean air outlet (44e), a motor (48) for driving the fan (50), separating apparatus (18) for separating dirt and dust from the airflow, a pre-motor filter (32) arranged upstream of the motor (50) and a post-motor filter (42) arranged downstream of the motor (50), wherein the post-motor filter (42) is housed in a casing (44) containing a plurality of slots or apertures (44e), the slots or apertures (44e) forming the clean air outlet and being arranged such that, in use, the airflow is diffused as it leaves the clean air outlet.



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A Vacuum Cleaner

The invention relates to a vacuum cleaner.

In general, a vacuum cleaner incorporates a dirty air inlet, separating apparatus for separating dirt and dust from an airflow, a fan and motor for drawing an airflow into the separating apparatus via the dirty air inlet, and an outlet for expelling clean air into the atmosphere. Very often, a pre-motor filter is arranged in the airflow path upstream of the motor to prevent any dust or debris remaining entrained within the airflow from entering the motor. This reduces the risk of the motor becoming damaged or worn as a result of dirt or dust passing therethrough and also prevents such dirt or dust from being expelled into the atmosphere. It is also quite common for a post-motor filter to be arranged downstream of the motor to prevent any carbon particles dislodged within the motor, for example from the brushes within the motor, from being expelled into the atmosphere with the airflow. These pre- and post-motor filters are normally simple filters or pleated filters which are positioned such that they are relatively easily accessible whilst being unobtrusive during normal use of the vacuum cleaner. Known vacuum cleaners house the pre- and post-motor filters in cassettes slidably receivable in slots or sockets in the motor casing or within the main casing so that they become visible when the cleaner is opened to allow the separating apparatus to be emptied.

A disadvantage of the existing pre- and post-motor filters is that they are often relatively small in size, which means that the available filtering surface is relatively small. The filters can therefore become clogged over a period of time, despite the small amount of dust and debris they collect, which can affect the performance of the vacuum cleaner. They therefore require to be cleaned or changed more often than is desirable and this leads to increased costs and/or customer dissatisfaction. A further disadvantage is that, because the filters are generally hidden during normal operation of the vacuum cleaner, the user of the vacuum cleaner is often unaware that the pre- or post-motor filter may require changing which frustrates the user of the vacuum cleaner.

Another disadvantage of known vacuum cleaners relates to the cleaner outlet. Very often, the clean air is expelled to the atmosphere in the form of a stream of air. In some cases the expelled air is directed in front of the cleaner which can disturb debris which the user intended to pick up with the cleaner. Streams of expelled air can also cause difficulties such as extinguishing pilot lights on gas fires or disturbing curtains, other furnishing or papers lying near the vacuum cleaner. The more powerful the motor of the cleaner, the more likely the expelled air is to cause a disturbance.

It is an object of the present invention to provide a vacuum cleaner having pre- and post-motor filters which do not require to be cleaned or replaced as frequently as known cleaners. It is a further object to provide a vacuum cleaner having pre- and post-motor filters, in which the fact that one or both of the filters requires cleaning or replacement is more readily apparent to a use of the vacuum cleaner than is currently the case. A still further object of the invention is to provide a vacuum cleaner in which the stream of air exiting the clean air outlet is less likely to cause difficulties than in known vacuum cleaners.

The invention provides a vacuum cleaner as claimed in claim 1. Utilising cylindrical filters exposes a significantly larger filtration surface area to the airflow which extends the useful life of each filter. The preferable co-axial arrangement of the filters with the airflow passing through the centre of the post-motor filter allows the filters to be conveniently located adjacent one another so that they can be accessed easily, should cleaning or replacement be required.

The invention also provides a vacuum cleaner as claimed in claim 8. The diffusion of the air as it exits the outlet reduces the intensity of the exiting airstream which avoids the problems mentioned above and reduces customer dissatisfaction.

An embodiment of the invention will now be described with reference to the accompanying drawings, wherein:

Figures 1a and 1b are side and front views respectively of a vacuum cleaner according to the invention;

Figures 2a and 2b are isometric views of the pre-motor filter and the pre-motor filter housing respectively, each forming part of the vacuum cleaner of Figures 1a and 1b;

Figures 3a and 3b are isometric views of the post-motor filter and the post-motor filter housing respectively, each forming part of the vacuum cleaner of Figures 1a and 1b; and

Figure 4 is a sectional side view of the filters of Figures 2 and 3 illustrated in coaxial arrangement as in use.

A vacuum cleaner according to the invention is illustrated in Figures 1a and 1b. As can readily be seen, the vacuum cleaner 10 is an upright cleaner having a cleaner head 12 which incorporates a dirty air inlet 14. A central support member 16 supports dust separating apparatus 18 on one side thereof and a filter arrangement 20 on the other side thereof. An upwardly extending handle 22 is positioned rearwardly of the central support member 16 and is optionally releasable in the manner of a wand if the vacuum cleaner 10 is to be used in the cylinder mode. The upwardly extending handle 22 incorporates a hand grip 24 and other features which do not form part of the present invention. The cleaner head 12 is pivotably attached to a motor casing 26 to which support wheels 28 are attached and inside which a motor is located. In use, the motor draws dirty air into the vacuum cleaner 10 via the dirty air inlet 14 or alternatively via the wand 22. The air then passes through the dirt and dust separating apparatus 18 and through the filter assembly 20 before being expelled to the atmosphere.

The dirt and dust separating apparatus 18 does not form part of the present invention. The separating apparatus 18 can take the form of a bag or other separating means, e.g. cyclonic separating apparatus. In the example shown, it is envisaged that the dirt and dust separating apparatus 18 will take the form of two concentric cyclones designed to remove dirt and dust particles from the airflow. The airflow is fed to the dirt and dust separating apparatus 18 via conduits housed within the central support member 16.

Once the airflow has passed through the dirt and dust separating apparatus 18, it is then transferred, via a conduit housed within the central support member 16, to the

filter assembly 20. The filter assembly 20 is located on the side of the central support member 16 remote from the dirt and dust separating apparatus 18.

It is envisaged that the general shape of the filter assembly 20 will be similar to that of the dirt and dust separating apparatus 18. For example, in the embodiment shown, the dirt and dust separating apparatus 18 will be generally cylindrical in shape and the filter assembly 20 will therefore also be cylindrical in shape with substantially the same diameter as that of the dirt and dust separating apparatus 18.

The filter assembly 20 consists of a pre-motor filter assembly 30 and a post-motor filter assembly 40. The pre-motor filter assembly 30 is illustrated in Figures 2a and 2b and the post-motor filter assembly 40 is illustrated in Figures 3a and 3b. Each assembly 30,40 consists of a cylindrical filter 32,42 located within a housing 34,44. In each cylindrical filter 32,42, the filtration material is pleated and formed into a cylindrical shape with caps 32a,32a',42a,42a' located at either end to maintain the shape of the filter. The pleating of each filter, the support mesh 32b,42b and the fitting of the filtration material into the end caps 32a,32a',42a,42a' are all standard and known in the art. These details will not be described any further here.

Each housing 34,44 is designed and arranged to hold the respective filter 32,42. Each housing 34,44 is also designed and arranged so as to direct the airflow entering the filter assembly 20 along the correct airflow path. The pre-motor filter housing 34 has a generally cylindrical outer wall 34a whose diameter is approximately 10mm larger than the external diameter of the pre-motor filter 32. This allows an annular chamber 34b to be formed between the outer surface of the pre-motor filter 32 and the cylindrical outer wall 34a of the housing 34. The upper end of the outer wall 34a is open to allow the pre-motor filter 32 to be dropped into the housing 34 with ease. A collar 34c extending outwardly from the upper end cap 32a centralises the filter 32 when dropped into the housing 34. A loop-shaped tab 32d is fixed to the upper end cap 32a to allow the filter 32 to be easily removed from the housing 34 when required. A similar collar 42c and tab 42d are fixed to the upper end cap 42a of the post-motor filter 42 for the same reason.

At the lower end of the pre-motor housing 34 is an annular base 34d having a cylindrical opening in the centre thereof. Upstanding from the annular base 34d are a

plurality of upstanding webs 34e on which the lower end of the pre-motor filter 32 is supported. Radial channels are formed between the upstanding webs 34e along which the airflow can pass. A ridge or groove 34f is formed in the annular base 34d around the periphery thereof to receive the post-motor filter housing 44.

The lower end of the pre-motor filter 32 is closed by means of the cap 32a' extending across the central aperture of the cylindrical filter 32. In this way, air is prevented from passing down the centre of the pre-motor filter 32 beyond the end cap 32a'.

The post-motor filter housing 44 also consists generally of an outer cylindrical wall 44a. The diameter of the outer cylindrical wall 44a is approximately 10mm greater than the outer diameter of the post-motor filter 42. This allows an annular chamber 44c to be created therebetween. A plurality of slots 44e are provided in the outer wall 44a and extend around substantially all of the circumference thereof. Bosses 44f are provided on the base of the post-motor filter housing 44 for receiving screws (not shown).

An inner cylindrical wall 44b forming part of the motor casing of the vacuum cleaner extends upwardly through the centre of the cylindrical post-motor filter 42. The upper lip of the inner cylindrical wall 44b is dimensioned and arranged so as to abut against the inner circumference of the annular base 34d of the pre-motor filter housing 34. Sealing means 45 are provided between the upper lip and the annular base 34d. The lower end of the inner cylindrical wall 44b is integral with a conduit 46 arranged in the motor casing 26 which leads the airflow through the fan 48 and past the motor 50 before returning it to the post-motor filter 42.

The diameter of the inner cylindrical wall 44b is approximately 15mm less than the inner diameter of the post-motor filter 42 so that a second annular chamber 44d is created therebetween. The second annular chamber 44d communicates with the conduit 46 downstream of the fan 48 and the motor 50. This portion of the conduit 46 is essentially the exhaust side of the motor housing.

The filter assembly 20 operates in the following manner. The airflow enters the pre-motor filter assembly 30 via a conduit 31 which communicates with the interior of the pre-motor filter 32. There being no axial escape route due to the cap 32a at the

bottom of the filter 32 extending across the interior of the filter 32, the airflow is forced to pass through the filter 32 in an outwardly radial direction. The airflow then enters the annular chamber 34b and passes downwardly to the conduits arranged between the upwardly extending webs 34e. The airflow passes radially inwardly between the webs 34e and then passes axially down inside the inner cylindrical wall 44b within the post-motor filter housing 44. The airflow thus by-passes the post-motor filter 42 until it has passed along the conduit 46 leading to the fan 48 and the motor 50. The airflow passes through the fan 48, around the motor 50, thus having a cooling effect, and then back into the second annular chamber 44d located between the post-motor filter 42 and the inner cylindrical wall 44b. Because the upper end of the post-motor filter 42 is sealed to the top of the inner cylindrical wall 44b, the airflow is forced to pass through the post-motor filter 42. It then passes through the annular chamber 44c and exits the post-motor filter housing 44 via the slots 44e into the atmosphere.

The conduit 46 and inner cylindrical wall 44b form part of the motor casing 26 of the vacuum cleaner 10 or may take the form of separate parts fixed to or located within the motor casing. The fan 48 and the motor 50 are also permanently housed within the motor casing 26. However, the pre-motor filter 32, the post-motor filter 42 and the pre-motor filter housing 34 are all removable from the vacuum cleaner 10. The post-motor filter housing 44 is permanently fixed by means of screws, preferably by passing the screws upwardly through bores in the motor casing and into the bosses 44f, into the position shown in Figure 1b. The post-motor filter 42 is made accessible by removing the pre-motor filter housing 34 from the vacuum cleaner 10. The post-motor filter 42 can then be removed from the fixed post-motor filter housing 44 via its open upper end.

At the upper end of the filter assembly 20, a releasable fastening device must be employed. Any appropriate releasable fastening means will suffice; for example, a snap-fit arrangement or releasable clip. The arrangement illustrated in Figure 4 consists of a rotatable collar 52 which, in its operational position, is biased into a downward position. A depending tube 54 having cylindrical walls makes a seal with the inner circumference of the end cap 32a of the pre-motor filter 32 so as to ensure that an airflow entering the filter assembly 20 is directed into the interior of the pre-motor filter

32, and also with the upper lip of the outer cylindrical wall 34a of the pre-motor filter housing 34. The tube 54 centralises and maintains the pre-motor filter 32 and the pre-motor filter housing 34 in the appropriate position. The ridge or groove 34f at the lower end of the cylindrical wall 34a maintains the desired relative positions of the pre-motor filter housing 34 and the post-motor filter housing 44.

The collar 52 is designed so as to be rotatable with respect to the body of the vacuum cleaner and also with respect to the pre-motor filter housing 34. Cam surfaces (not shown) are provided such that, when the collar 52 is rotated, it is lifted with respect to the pre-motor filter housing 34 so that the tube 54 depending from the collar 52 is raised clear of the filter 32 and the housing 34. Biasing means (not shown) are provided in order to bias the collar 52 into its downward position in order to avoid inadvertent raising of the collar 52. The biasing means can take the form of a stop detail in the profile of the cam surfaces, resilient plastic strips, deformable foam materials, torsion springs etc.

In order to remove the filter assembly 20 from the vacuum cleaner 10, the collar 52 is rotated against the action of the biasing means. The cylindrical walls of the tube 54 depending from the collar 52 are raised clear of the filter 32 and the cylindrical wall 34a of the housing 34. This allows the housing 34 to be lifted slightly and removed from the post-motor filter housing 44. As soon as the pre-motor filter housing 34 has been removed, the post-motor filter 42 can be removed from the post-motor filter housing 44 merely by lifting it from the housing 34. The pre-motor filter 32 can also be lifted or tipped out of its housing 34. Removing either or both housings 34,44 means that either or both filters 32,42 can be removed or replaced as desired.

The housings 34, 44 are moulded from transparent plastics materials. The transparency of the cylindrical walls 34a,44a of the housings 34,44 allows a user of the vacuum cleaner 10 to inspect the filters 32,42 for signs of clogging. There is no requirement that the pre-motor filter 32 and post-motor filter 42 be inspected only when the dust separating apparatus 18 are accessed for emptying purposes. The filters 32,42 are visible to the user at all times and the user can therefore readily determine whether or not either or both filters 32,42 require replacement. Because both the pre-motor

filter 32 and the post-motor filter 42 are cylindrical filters having large filtration surface areas, it is envisaged that neither filter 32,42 will require replacement very often.

The slots 44e located in the post-motor filter housing 44 extend around substantially all of the circumference of the housing 44. The substantial area through which the airflow is expelled from the vacuum cleaner 10 means that the strength of the exiting airflow is not high. Furthermore, because the slots are arranged on a curved surface, in this case a cylindrical surface, the airflow is diffused as it leaves the vacuum cleaner. The strength of the airflow is thereby considerably reduced and therefore the problems previously associated with concentrated airflows are avoided.

As a further example, the following dimensions are given in order to further enable a skilled reader to put the invention into practice.

External diameter of filters 32,42	10cm
Internal diameter of filters 32,42	5.2cm
Length of filters 32,42	14cm
Internal diameter of outer cylindrical walls 34a,44a	11cm
External diameter of inner cylindrical wall 44b	3.7cm

The scope of the invention is not limited to the precise details of the embodiment described above. Modifications and variations will be apparent to a reader skilled in the art. For example, the post-motor filter housing can be made releasable from the motor casing if desired.

CLAIMS

1. A vacuum cleaner comprising an airflow path having a dirty air inlet and a clean air outlet, a fan for drawing an airflow along the airflow path from the dirty air inlet to the clean air outlet, a motor for driving the fan, separating apparatus for separating dirt and dust from the airflow, a pre-motor filter arranged upstream of the motor and a post-motor filter arranged downstream of the motor, wherein both the pre-motor filter and the post-motor filter are cylindrical filters
2. A vacuum cleaner as claimed in claim 1, wherein the airflow is arranged to flow radially outwardly through each of the filters when the vacuum cleaner is in use.
3. A vacuum cleaner as claimed in claim 1 or 2, wherein the pre-motor filter and the post-motor filter are each housed in a transparent casing.
4. A vacuum cleaner as claimed in claim 3, wherein the pre-motor filter and the post motor filter are housed in separate transparent casings.
5. A vacuum cleaner as claimed in claim 4, wherein the cylindrical filters are arranged coaxially and adjacent one another, the airflow path passing through the centre of the post-motor filter between the pre-motor filter and the motor.
6. A vacuum cleaner as claimed in claim 5, wherein the cylindrical filters are positioned generally upright and parallel to the separating apparatus, the upper end of the uppermost casing being held in place by means of a retractable collar.
7. A vacuum cleaner as claimed in claim 6, wherein the collar is biased into a non-retracted position in which the uppermost casing is retained in place.
8. A vacuum cleaner comprising an airflow path having a dirty air inlet and a clean air outlet, a fan for drawing an airflow along the airflow path from the dirty air inlet to

the clean air outlet, a motor for driving the fan, separating apparatus for separating dirt and dust from the airflow, a pre-motor filter arranged upstream of the motor and a post-motor filter arranged downstream of the motor, wherein the post-motor filter is housed in a casing containing a plurality of slots or apertures, the slots or apertures forming the clean air outlet and being arranged such that, in use, the airflow is diffused as it leaves the clean air outlet.

9. A vacuum cleaner as claimed in claim 8, wherein the casing is cylindrical and the slots or apertures extend around at least part of the circumference thereof.
10. A vacuum cleaner as claimed in claim 9, wherein the slots or apertures extend around at least half of the circumference of the casing.
11. A vacuum cleaner as claimed in any one of claims 8 to 10, wherein the casing is transparent.
12. A vacuum cleaner as claimed in any one of the preceding claims, wherein the airflow is arranged to pass across or around the motor to provide cooling.
13. A vacuum cleaner as claimed in any one of the preceding claims, wherein the separating apparatus comprise at least one cyclone.
14. A vacuum cleaner as claimed in claim 13, wherein the separating apparatus comprise two concentric cyclones.
15. A vacuum cleaner as claimed in any one of the preceding claims, wherein the pre-motor filter and the post-motor filter are substantially the same size.
16. A vacuum cleaner as claimed in claim 15, wherein the pre-motor filter and the post-motor filter have substantially the same characteristics.

17. A vacuum cleaner substantially as hereinbefore described with reference to the accompanying drawings.

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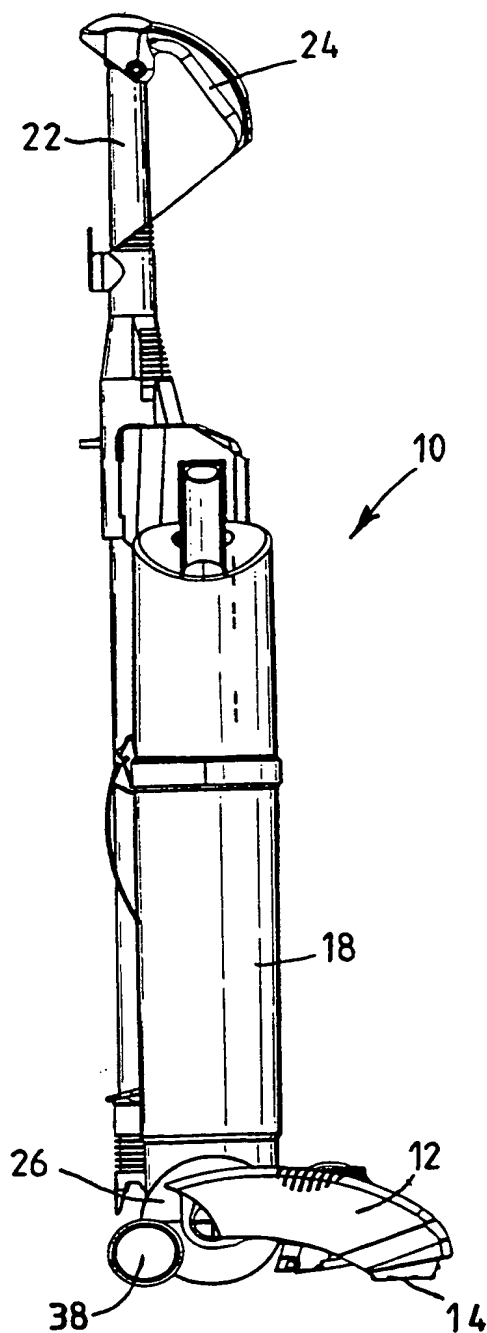


Fig. 1a

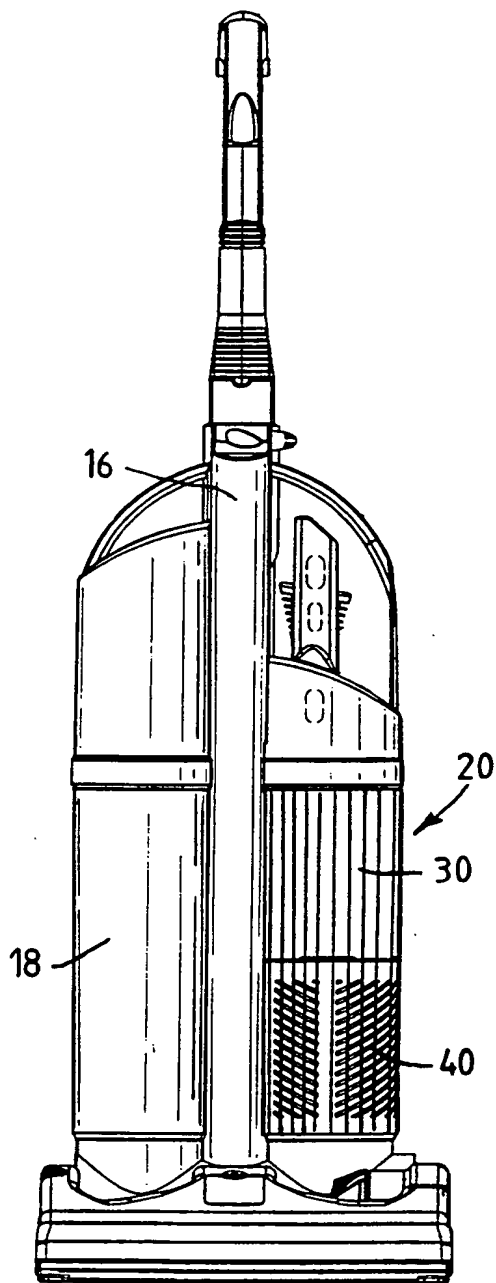
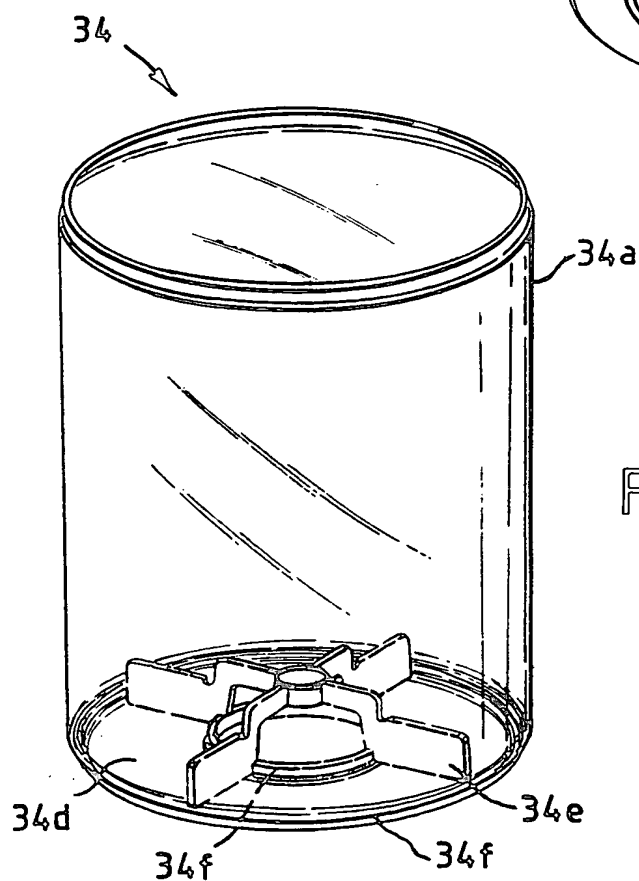
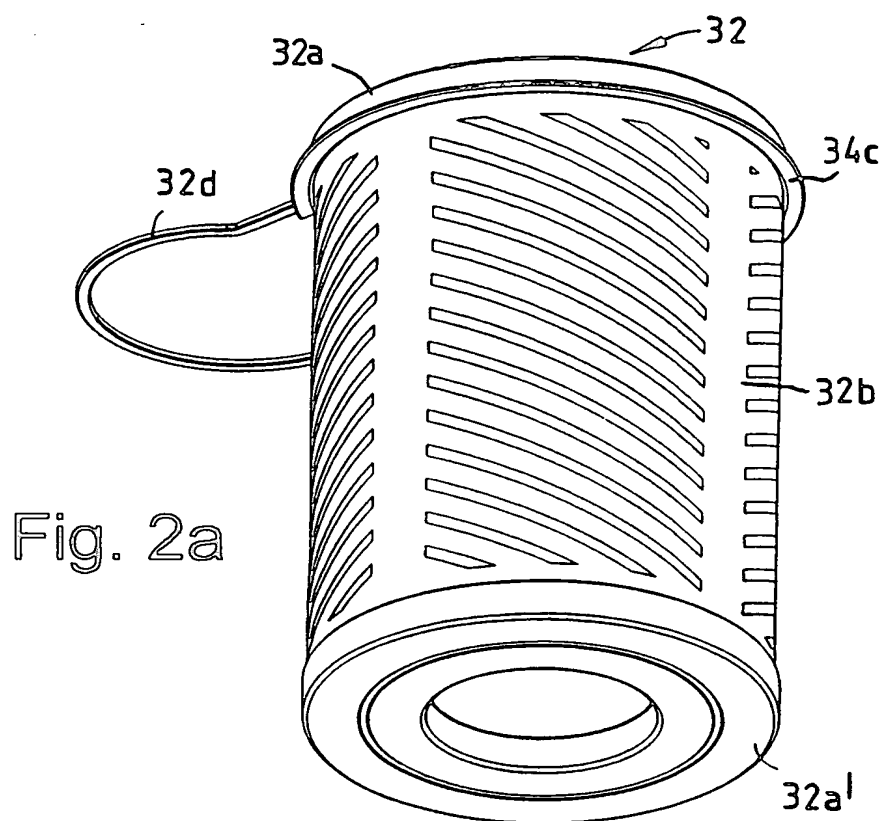


Fig. 1b

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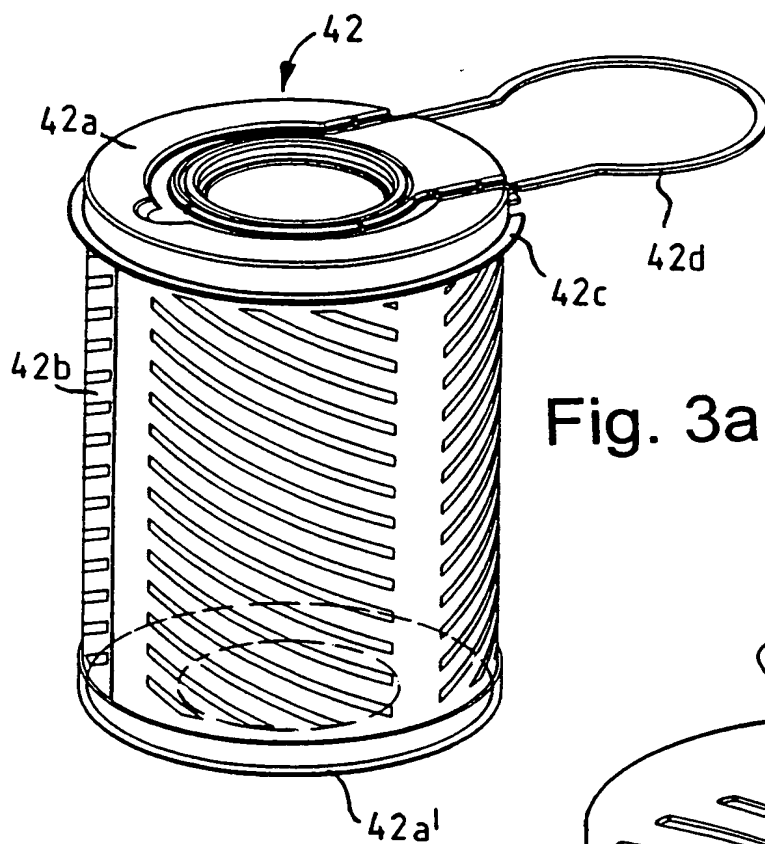


Fig. 3a

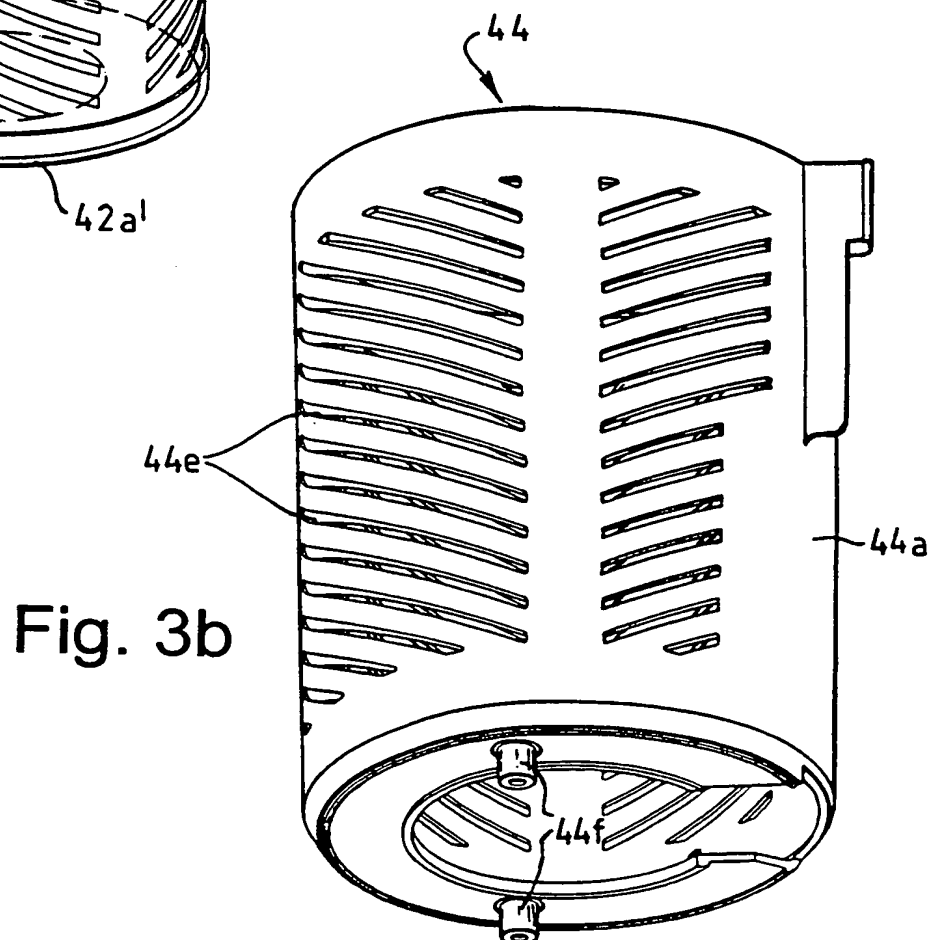
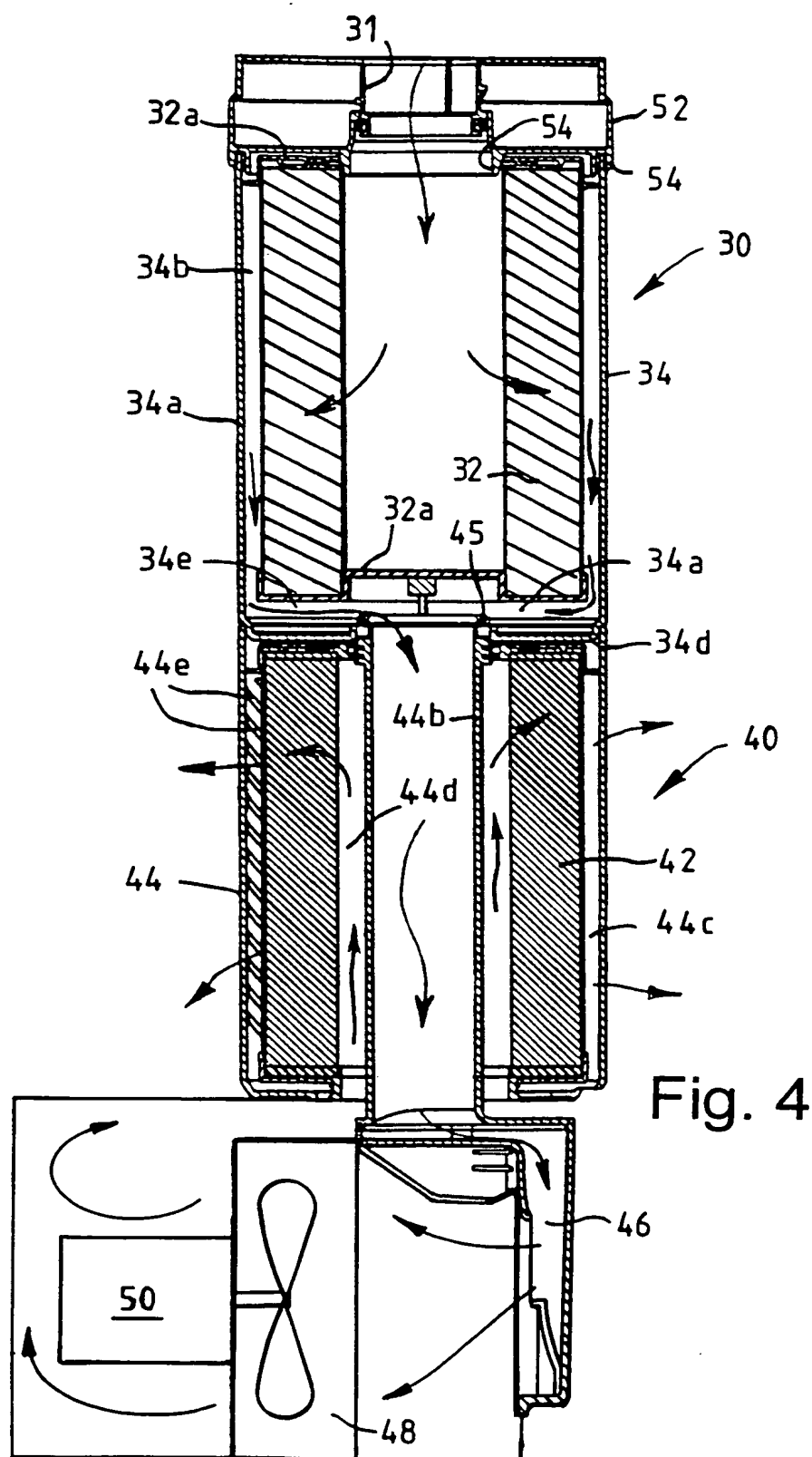


Fig. 3b

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A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 A47L9/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 245 224 A (PULLMAN AB) 11 November 1987 see page 6, line 30 - page 7, line 34 ---	1,12,13
A	US 5 230 722 A (YONKERS ROBERT A) 27 July 1993 see column 2, line 47 - column 3, line 4; figures 1-8 ---	1,12
A	GB 2 167 680 A (ENVIRO VAC LIMITED) 4 June 1986 see the whole document ---	1
A	DE 93 17 809 U (VORWERK & CO INTERHOLDING GMBH) 22 November 1990 see page 7, line 4 - page 9, line 22; figure 2 --- -/-	8

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 86 07 553 U (VORWERK & CO INTERHOLDING GMBH) 15 May 1986 see page 2, line 10 - page 3, line 2 -----	8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 98/03816

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-7,12-17

Vacuum cleaner comprising a separating apparatus provided with a pre-motor filter and a post motor-filter said filters being characterized in that the filters are cylindrical. The objective problem to be solved by this particular arrangement of the filters is to improve the filtering characteristics with respect to clogging compared to known apparatuses provided with filters of the flat type.

2. Claims: 8-11

Vacuum cleaner comprising a separating apparatus provided with a pre-motor filter and a post motor-filter characterized in that the post-motor filter is housed in a casing containing a plurality of slots. The objective problem to be solved by this arrangement is to avoid a stream of air to be expelled.

The two groups of claims concern different subject-matter which solve problems which are not linked by a single inventive concept.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0245224 A	11-11-1987	SE 452850 B AT 58631 T SE 8601621 A	21-12-1987 15-12-1990 11-10-1987
US 5230722 A	27-07-1993	NONE	
GB 2167680 A	04-06-1986	NONE	
DE 9317809 U	23-03-1995	NONE	
DE 8607553 U	15-05-1986	NONE	